

## Recent Advancements in Surface Science Instrumentation - The LT Nanoprobe

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A major challenge in the development of novel devices in nano- and molecular electronics is their interconnection with larger scaled electrical circuits. Local electrical probing by multiple probes with STM precision can significantly improve efficiency in analyzing electrical properties of individual structures on the nano-scale without the need of a full electrical integration.

We developed a microscope stage that merges the requirements of a SEM navigated 4-probe STM and at the same time satisfies the needs for high performance SPM. Besides SEM/STM probe fine navigation, the excellent STM/AFM performance level of the LT NANOPROBE at  $T < 5K$  expands applications to tunneling spectroscopy and even the creation or modification of nano-structures by a sharp and precise SPM probe. Extremely low thermal drift competitive to state-of-the-art low temperature STMs allows for sufficient measurement time as needed for experiments on the atomic scale.

QPlus NC-AFM imaging with excellent atomic

resolution extends the field of applications to non-conducting surfaces.

In this contribution we will focus on measurements that prove the performance level of the instrument as well as on tunneling spectroscopy and atom manipulation experiments on Ag(111).

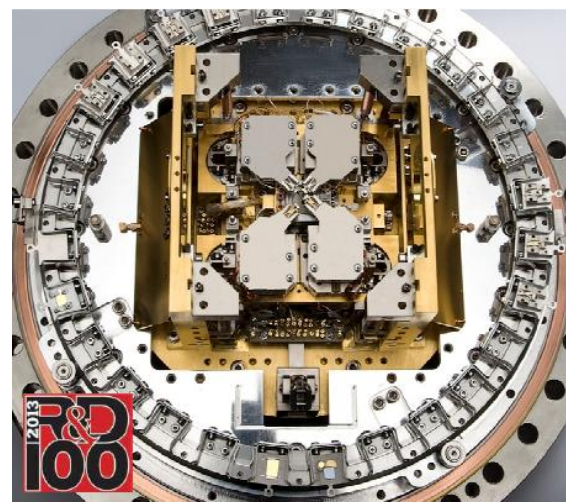
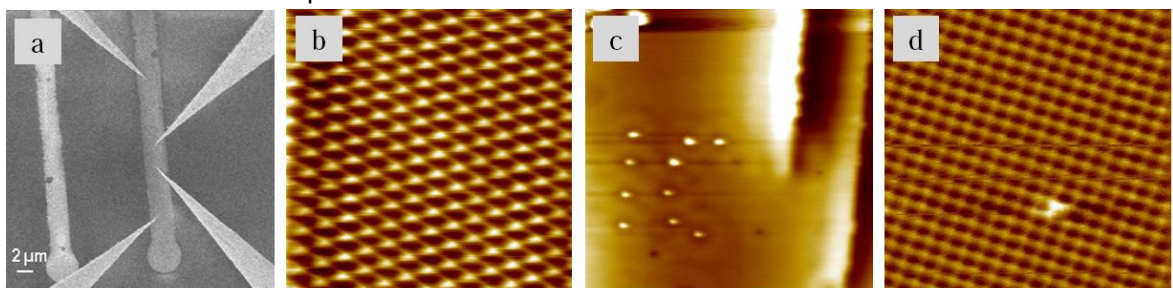


Figure 1. The LT Nanoprobe stage showing 4 SPM units.



### Measurements.

- a) SEM image of 4 STM probes placed on a Fe-nanowire for 4-point conductance measurements at  $T < 5K$ .
- b) High resolution STM image of a Ag(111) surface at  $T < 5K$ .
- c) Atom manipulation of Ag-particles on a Ag(111) surface at 5K.
- d) High resolution NC-AFM image of a NaCl(001) surface at  $T = 4.4K$ .